

REMARKS

The present application is a divisional of Applicants' prior application Serial No. 09/895,416, now U.S. Patent 6,756,517, the claims of that patent being drawn to a process for producing an olefin (alkene) by vapor phase oxidative dehydrogenation of alkane having from 2 to 5 carbon atoms in the presence of molecular oxygen and in the presence of an oxidative dehydrogenation catalyst comprising a multimetal mixed oxide having the formula



where Mn denotes manganese;

O denotes oxygen;

E¹ represents one or more metal elements selected from the group consisting of phosphorus, arsenic, antimony, boron, sulfur, selenium, tellurium, fluorine, chlorine, bromine, iodine, niobium, tantalum, tungsten, rhenium and copper;

E² represents one or more metal elements selected from the group consisting of chromium, iron, cobalt, nickel, silver, gold, zinc, thallium, tin, lead, bismuth, lithium, sodium, potassium, rubidium, cesium, magnesium, calcium, strontium, barium, yttrium, lanthanum, cerium, neodymium, and samarium; and,

α , β , γ and x denote atomic numbers of Mn, E¹, E², and oxygen, respectively, and,

when $\alpha=1$, $\beta=0.01-10$, $\gamma=0-5$, and x has a numerical value determined by the state of oxidation of the elements other than oxygen.

The invention of the present application is drawn to a process for producing unsaturated aldehyde and unsaturated acid in which the olefin or alkene having from 2 to 5 carbon atoms produced by the process of the parent application is subjected to vapor phase oxidation in the presence of molecular oxygen and a further catalyst comprising a molybdenum-containing, multimetal, mixed oxide catalyst. That second vapor phase oxidation produces unsaturated aldehydes and unsaturated acids from the C_2 to C_5 alkene obtained from the first vapor phase oxidation of C_2 to C_5 alkane. In an optional third vapor phase oxidation in the presence of molecular oxygen and a further molybdenum-containing, multimetal, mixed oxide catalyst, additional unsaturated acid is obtained from the unsaturated aldehyde obtained from the second vapor phase oxidation.

The distinction between the invention of the parent application and the invention of the present application was not immediately clear from the claims as filed herein and subject to the restriction requirement of November 5, 2007. However, inasmuch as the claims as originally filed and elected in response to the restriction requirement were ultimately drawn to a process for producing unsaturated aldehyde and unsaturated acid by vapor phase oxidative dehydrogenation of C_2 to C_5 alkene, Applicants respectfully submit that the amendments herein may be

properly entered and, present the claims in a form reading upon that elected invention.

As stated in the specification of the present application at Page 1, lines 14-18:

"The invention also relates to a process for producing, from the olefins which have been obtained through vapor phase oxidative dehydrogenation of C₂-C₅ lower alkanes in the presence of molecular oxygen, the corresponding unsaturated aldehydes and/or unsaturated carboxylic acids."

As recited in the claims of the parent patent, the vapor phase oxidative dehydrogenation of the C₂-C₅ lower alkanes takes place in the presence of the catalyst of the formula $Mn_{\alpha}E^1_{\beta}E^2_{\gamma}O_x$. Accordingly, the present application presents the process for producing unsaturated aldehydes and/or acids from the olefins or alkenes obtained through that first vapor phase oxidative dehydrogenation step.

The present application further provides that:

"The olefins (alkenes) which are obtained through the vapor phase oxidative dehydrogenation of C₂-C₅ lower alkanes (alkane oxidative dehydrogenation step) using the catalyst of the present invention (i.e., $Mn_{\alpha}E^1_{\beta}E^2_{\gamma}O_x$) can be further oxidized to produce unsaturated aldehydes and unsaturated acids (alkene oxidation step). The unsaturated aldehydes can be further oxidized to produce unsaturated acids (aldehyde oxidation step)." (Page 8, lines 10-17).

The claims as amended and presented herein are therefore directed to the process whereby unsaturated aldehydes and acids are produced by oxidation of the C₂-C₅ alkenes obtained through the vapor phase oxidative dehydrogenation of the C₂-C₅ lower alkanes,

that is, the alkene oxidation step and the aldehyde oxidation step. Since those steps are dependent upon the first oxidative dehydrogenation step of C_2-C_5 lower alkanes in the presence of the catalyst of formula $Mn_\alpha E^1_\beta E^2_\gamma O_x$, Applicants respectfully submit that the present amendments clarifying the claimed process are proper and read upon the process as elected in their concurrently filed response to the restriction requirement.

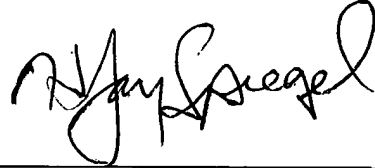
Applicants further respectfully submit that the amendments and new claims presented herein are fully supported by the specification as filed and respectfully direct the examiner's attention to the specification at pages 8-10 where the molybdenum-containing catalysts for the alkene and aldehyde oxidation steps are specifically disclosed, and to Examples 26 and 27 at pages 20 and 21 where the process of the present invention is described in combination with the initial alkane oxidation.

In view of the foregoing, Applicants respectfully submit that the present amendments and new claims presented herein are fully supported by the application as filed, that they read upon the invention elected in response to the restriction requirement, and that no new matter has been presented.

Applicants respectfully submit that the present application is in condition for allowance and an early notice thereof is respectfully requested.

Respectfully submitted,

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A handwritten signature in cursive script, appearing to read "H. Jay Spiegel", written over a horizontal line.

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